U.S. Department of Transportation
Federal Aviation Administration

Subject:	POLICY: Airspeed Displays for Electronic Flight Instrument Systems (EFIS)	Date:	FEB 25, 1992
From:	Manager, Transport Airplane Directorate, ANM-100	Reply to Attn. of:	
To:	See DISTRIBUTION		

A recent Type Certification program raised an important issue related to airspeed awareness cues presented by EFIS displays, in particular linear tape airspeed displays with moving scales. As a result the following is being provided as supplementary guidance information to that contained in paragraph 7.d.(2)(i) of Advisory Circular (AC) 25-11, "Transport Category Airplane Electronic Display Systems" dated 7/16/87.

Whether pneumatically or electronically driven, the traditional display of airspeed has been via a round dial with a rotating needle pointing to airspeeds presented on a graduated arc. In some cases this display may have also been supplemented by an analog drum type presentation of the present value of the airspeed. As noted in paragraph 7.d.(2)(i) of AC 25-11, the round-dial and pointer airspeed indicator displays are "...able to convey to the pilot a quick-glance sense of the present speed..." just by observing the angular position of the pointer.

Due to the wide operating speed range capabilities of transport category airplanes and limited EFIS display area, it is not possible to accommodate this same type of fixed scale with moving pointer for EFIS airspeed display. Consequently, the moving scale display has been adopted with centered display of present airspeed in larger digits.

Since the moving scale display does not provide any inherent visual cue of the relationship of present airspeed to low or high airspeed limits, many EFIS displays utilize an amber and red bar adjacent to the airspeed tape to provide this quick-glance low/high speed awareness. The amber bar display will begin at some multiple of the stall speed and the red bar at the stall warning speed.

The airplane referenced in the opening paragraph utilized such an airspeed awareness visual cue system. The system was found not to present adequate and accurate low airspeed awareness information due to its invariability with airplane weight and flap configuration. The applicant had selected a fixed intermediate speed above which the EFIS gave low airspeed caution and warning, regardless of airplane gross weight and flap position. Subsequent investigation revealed several transport category airplanes had similar EFIS installations incorporated by Supplemental Type Certificate (STC).

As a result of the above finding, this guidance letter has been formulated to warn against the approval of any EFIS airspeed awareness display, be it low or high speed, that does not take into account all independent parameters that may affect the speed against which protection is being provided. This is most important in the low speed regime where all transport category airplanes have a wide range of stall speeds due to multiple flap/slat configurations and potentially large variations in gross weight.

The regulatory basis of this policy is as follows:

Section 25.1501(b) states: "The operating limitations and other information necessary for safe operation must be made available to the crewmembers as prescribed in §§ 25.1541 through 25.1587."

Section 25.1503 states: "When airspeed limitations are a function of weight, weight distribution, altitude, or Mach number, limitations corresponding to each critical combination of these factors must be established."

Section 25.1541(a)(2) states: "The airplane must contain any additional information, instrument markings, and placards required for the safe operation if there are unusual design, operating, or handling characteristics."

The EFIS low and high airspeed awareness cues are interpreted as "instrument markings" that provide information to the crewmembers that is necessary for safe operation of the airplane. These cues provide crew awareness of encroachment upon an airspeed limitation and should therefore comply with the requirements of § 25.1503 when the associated airspeed limitation is a function of airplane and operating variables.

Original Signed by
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